THE DIET OF THE WHITECHEEKED BULBUL *PYCNONOTUS LEUCOGENYS*[1]

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(*With four text-figures*)

The whitecheeked bulbul is a very common bird of date palm-citrus orchards in Iraq, and has often been accused of causing damage to fruits. The bulbul is frugivorous, feeding mainly on ripe fruits and in particular ripe dates (90% of total fruits eaten). It also takes insects, mainly ants and wasps, in proportion related to their availability in the field. In addition, flowers, nectar, and green fresh leaves were also recovered in the food. Damage to fruits could occur only if fruits were left on the trees for longer periods than necessary after ripening or secondarily to damage caused by other animals.

INTRODUCTION

The whitecheeked bulbul *Pycnonotus leucogenys mesopotamia* Ticehurst is one of the most common passerines of date-palm plantations in Iraq. It is particularly common in mixed date palm-citrus orchards where the bulbul benefits from this association by using the first as food and the second for nesting. Furthermore, the bulbul is the only cage-bird from the Iraqi avifauna.

P. l. mesopotamia (Family Pycnonotidae) is rather limited in distribution in the valleys of Tigris and Euphrates rivers in Iraq. It has also been recorded from south Iran and the eastern parts of the Arabian Peninsula (Meinertzhagen 1954, Allouse 1962). The other subspecies *P. leucogenys leucotis* have extended distribution and are found in Afghanistan, Pakistan and Himalayas to E. Assam (Walters 1980). The bird is medium sized (total length *c.* 20 cm) and easily distinguished by the black to immature brown head and the large white patch on each cheek, also by its yellow vent and the white spots on the tip of the tail.

The bulbul has been described by Allouse (1962) as being frugivorous and takes insects only occasionally, a diet resembling that of many other bulbuls of the family Pycnonotidae (Ali 1943, Austin 1961). Consumption of fruits has aroused apprehension as to the role of bulbuls as pests. Meinertzhagen (1954) accused them of causing immense harm to dates in Bahrein; Baker (1922) reported damage to fruits in India; and Ali and Ripley (1971) believe that bulbuls are apt to do some damage in gardens to buds, fruits and vegetables. Similar allegations are often made by Iraqi farmers, but without soundproof. Therefore, the present work was set up to examine in some detail the food of the bulbul and their role in date palm-citrus orchards, and also to evaluate the possibility of their causing damage to various fruits.

METHODS

A total of 395 birds was collected for the period from August, 1983 to August, 1984. Collection was made by mist nets (2.4 × 12 m × 4 shelves, and 36 mm mesh). Four nets were

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set up in line in a carefully chosen area among the citrus. These were operated for an average of 30 h per month. Trapped birds were weighed upon removal from the net, their standard measurements were taken and then carried to the laboratory in sealed polythene bags.

At the laboratory, each bird was eviscerated and its stomach content was emptied into a small petri-dish for examination. It was analysed following different methods depending on their suitability with the type of food material found in the stomach (Hartely 1948, Hyslop 1980). The contribution of major food groupings: animal food, fruits, flowers, leaves to the total food present in the stomach was estimated by point method. A scale of one to ten points was awarded proportional to their estimated contribution to stomach volume. Insects were identified to family level and other animals as far as it was possible. The number of individuals in each category was then counted and their sizes determined. Sizes of fragmented insects were determined by comparison with adult specimens collected from the same habitat. In all cases, the presence of each food item in individual stomach was recorded for the calculation of percentage occurrence.

Study site and Avifauna

A part of the vast date-palm-citrus orchards that extend along both sides of River Tigris north of Baghdad was chosen as the study site. The selected site is 40 ha at Al-Huwaish village (45 km northeast of Baghdad). Date palm-citrus orchards are well organized forests, where date-palm trees are planted as cover; under which citrus is usually planted in thick rows along irrigation canals. The main types of citrus are orange; but lemon, sweet lemon, citron, grape, mandarin and bitter lemon are also planted. Other common fruit trees in the order of their importance are: pomegranate, plums, apricot, peach, apple and fig. The orchard floor is covered with annual herbs and other shrubs which are weeded continuously, especially in well managed orchards. In most areas, citrus are planted at a distance leaving an area from the river banks which is usually flooded during winter. The farmers utilize the latter ground for growing vegetables, such as cucumbers, cowpeas and green beans. When not in use it becomes covered with thick growth of poplar, tamarisk and reeds.

The associated avifauna of date palm-citrus orchards is very rich including resident, winter visitors, summer visitors and passage migrants. The most common resident birds next to the bulbul are the house sparrow (*Passer domesticus*), ringed dove (*Sterptopelia decaocto*), magpie (*Pica pica*), wood pigeon (*Columba palumbus*) and babblers (both Iraqi *Turdoides altirostris* and common *T. caudatus*). Wintering birds usually arrive at the site in early October and leave late in May. These include many small passerines, of which the robin (*Erithacus rebecula*) and the willow warbler (*Phylloscopus trochilus*) are the most abundant. Many warblers pass through the site during their spring and autumn migration and become common for short periods. During summer, the rufous warbler (*Erythropygia galactotes*) and the turtle dove (*Streptopelia turtor*) are abundant. They arrive in early May, breed in the area, and leave by late October. Resident birds have different food and feeding habits; similarly, most of the visitors are insectivorous birds. Therefore, little competitive influence is expected from these birds on the bulbul.

The climate of the area is relatively harsh. Temperature is over 40°C for more than four months (June-September). The mean monthly maximum temperature during the period of

study varied between 16.0°C in January and 43.9°C in July. The respective mean minimum temperature was 4.4° to 25.2°C during the same months. Together with such high temperatures, rainfall is only limited to December-February, with an average monthly precipitation of less than 25 mm. Relative humidity is consequently low. It varied between 23% in July and 77% in December. Relative humidity was less than 50% for nine months of the year. The climate could, therefore, be summed up as hot and dry for most of the year.

Results

Abundance and general habits:

The bulbul was the most common resident bird in date palm-citrus orchards. Attempts to measure their density were not very successful because of the thick cover of orange trees and the silent escape behaviour of bulbuls when disturbed. However, a "netting index" is presented to reflect monthly changes in relative abundance and pattern of activity changes (Fig. 1). The mean monthly number of birds

Fig. 1. Monthly changes in the "netting index" of bulbuls trapped during the period of study.

trapped per ten-hour netting varied with peaks in June and September. The first peak coincided with the completion of the first clutch and the second with that of the second clutch. This was evident from the relatively high proportion of juveniles trapped during these two months.

Outside the breeding season, bulbuls usually move about in loose flocks of 5 to 15 birds. Pairs maintain their bond within the flock and throughout the inter-breeding season. At the beginning of March, new pairs were formed and soon flocks were dissolved. Paired bulbuls commence breeding by the beginning of April and continue throughout the summer, with at least two clutches laid per season. Breeding was over by September and flocks reappeared afterwards. Nests were built on the low branches of citrus (1.5-2 m high) and in particular those branches overhanging the irrigation canals. The nest was an untidy open cup, usually made of thin dry twigs and fibres obtained from date-palm trunks. Each nest contained three eggs (range 2-4) which had a pinkish ground colour spotted heavily with dark brown without a noticeable pattern.

Bulbuls actively foraged for most of the day; full stomach (<50% full) was equally distributed among the daily hours of feeding. Also, no seasonal variations were noticed in feeding activity or time of food collection. The food was gathered at almost all possible places, ranging from date-palm tops, (about 10 m) to feeding on the ground. Several techniques were used for food gathering and handling, depending on type of food. Most fruits were picked up from trees, and sometimes from those fallen on the ground. Insects were collected from among foliage, tree trunks, ground fruits (infested with insect pests) and from the air. Aerial feeding seems to be a common practice in bulbuls (Severinghaus 1978); and has been reported for *P. l. mesopotamia* by Meriwani (1973).

The food of the bulbul:

The bulbul was basically frugivorous, feed-

ing on a wide range of available ripe fruits in their habitats. Flowers and leaves were also taken in relatively smaller quantities (Table 1). Animal food was also common and included mainly different types of relatively small insects (Table 1).

Among fruits, ripe dates were the most desired (90% of total fruit consumed). These were available for long periods from late August to March or April. Some varieties were more readily consumed than others. Other fruits were also taken, some with noticeable preference. These, according to the degree of preference were: figs, mulberries, peaches, pomegranate, apple, pear, grapes and plums. The appetite for figs and mulberries was so strong that bulbuls usually congregated on these trees for feeding when fruits were ripe. However, these fruits remain unimportant in terms of their total contribution to the bulbuls' diet because of the short period when they were actually available.

TABLE 1

A LIST OF *Pycnonotus leucogenys* DIET AND THE RELATIVE IMPORTANCE OF THE FOOD ITEMS

FRUITS		Hymenoptera	
Dates (*Phoenix dactylifera*)	++	FORMICIDAE	++
Fig (*Ficus carica*)	+	VESPIDAE	++
Mulberry (*Morus nigra*)	+	BRACHIONIDAE	+
Pomegranate (*Punica* sp.)	+	SCOLIIDAE	(+)
Peach (*Amygdalis persica*)	+	EVANIDAE	(+)
Plums (*Prunus* sp.)	(+)	ANDRENIDAE	(+)
Apricot (*Armeniaca* sp.)	(+)	ICHNAEIONIDAE	(+)
Apple (*Malus communis*)	(+)	HALCITIDAE	(+)
Grape (*Vitis* sp.)	(+)	MEGACHILIDAE	(+)
FLOWERS		Hemiptera	
Vegetables:		PENTATOMIDAE	+
Okra, Cucumbers, Cowpeas	+	COREIDAE	+
Orange flower & Nectar	(+)	LYGAEIDAE	(+)
Fruit tree flowers	(+)	TINGIDAE	(+)
LEAVES		Orthoptera	
Vegetable fresh leaves	+	ACRIDIDAE	+
Leaf buds	(+)	GRYLLIDAE	(+)
ANIMAL FOOD		GRYLLOTALPIDAE	(+)
Coleoptera		Homoptera	
NITIDULIDAE	++	APHIDIDAE	+
CHRYSOMELIDAE	+	Neuroptera	
TENEBERIONIDAE	+	CRYSOPIDAE	(+)
ALLECULIDAE	(+)	Diptera	
BRUCHIDAE	(+)	CULICIDAE	(+)
APIONIDAE	(+)	SYRPHIDAE	(+)
COCCINELLIDAE	(+)	Arachnida	+
SCARABIDAE	(+)	Mollusca	(+)
STAPHILINIDAE	(+)		
Unidentified	+		

++ common, < 15% occurrence; + present in moderate numbers mostly > 10% occurrence, (+) rare, present in > 5 individuals

Several types of flowers were consumed, most important of which were vegetable flowers (Table 1), available mainly during summer. Citrus flowers were also taken during the short period of blooming during early March. The nectar from date-palm male flowers (spadix), available during late March and early April was taken with noticeable greed. Trapped bulbuls had their bills tinted with yellow at this time of the year, owing to the coating by pollen from the spadix. However, nectar from the large flowers of some vegetables could also produce a similar effect. Plant leaves, usually leaf buds, were less common in the food and were mainly from vegetables.

Animal food was mainly insects (Table 1), and occasionally some arachnids (Lycosid spiders) and molluscs were recorded in the diet. The distribution of insect orders, both as percentage occurrence and percentage of total number of insects present in the food is shown in Fig. 2. The figure demonstrates clearly that Coleoptera and Hymenoptera were equally important, and constituted the major bulk of insect food. Hemiptera was next in importance with moderate number of insects in the diet. Other insects were less common and their percentage occurrence or their numbers did not exceed 5% of total food examined. The number of homopterans (Aphids) was an exception because of the large number of these tiny insects recovered from several bulbuls. Among Coleoptera, the Nitidulidae (mainly *Carbophilus* sp.) were the most common. These beetles usually infest ripe fruits and were collected directly from them by the bulbuls. Ants (Formicidae) and wasps (Vespidae) were the most common among Hymenoptera; the former were collected mainly from the ground, while the latter were caught on the wing (aerial feeding).

The sizes of insects taken by bulbuls varied between 2-20 mm in length. Parts of larger insects (*c.* 40 mm), were occasionally observed. Frequency distribution of the size of insect (Fig. 3) was skewed towards the smaller ones.

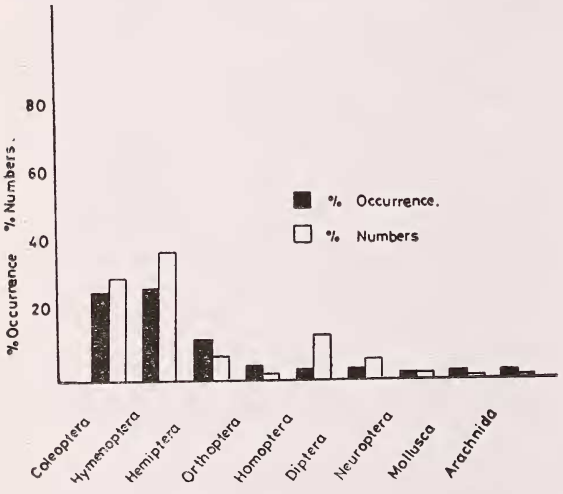

Fig. 2. Percentage occurrence and percentage of numbers of animal material in the diet of the bulbul. Solid bars; % occurrence, clear bars; % numbers.

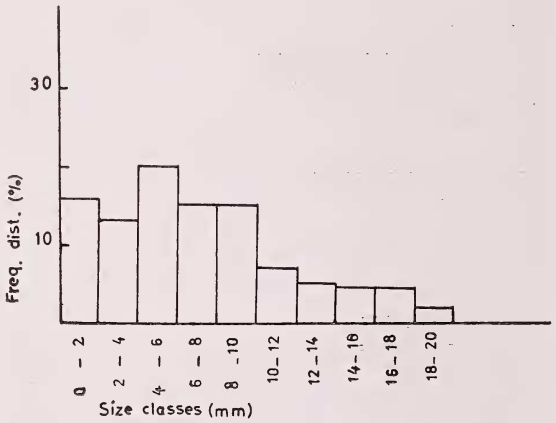

Fig. 3. Frequency distribution of insect sizes taken by the bulbul in the diet.

This was due to the relatively large numbers of small-sized nitidulid beetles and aphids found among the food of the bulbul.

Seasonal changes in the diet:

The monthly changes in the main food items — animal food, fruits, flowers and leaves are presented in Fig. 4, both as percentage occurrence and percentage contribution by volume of these food items to the stomach content (points method). The figure shows that fruits dominated the food for most of the year, and were particularly important during winter (December-March). The high percentage occurrence of fruits during several months was mainly due to the regular occurrence of dates in the food, while those of April and May were due to the presence of the seasonal fruits. Animal food varied among months depending probably on their availability. Therefore, more animal food was recorded during summer (April-November). Flowers were less important and varied widely among the months. However, two distinct peaks in flower consumption coincided with peak flowering seasons i.e. March for the spring blooming trees and September for vegetable species. Fresh leaves were taken irregularly without a clear pattern, and were not recorded in the diet for several months.

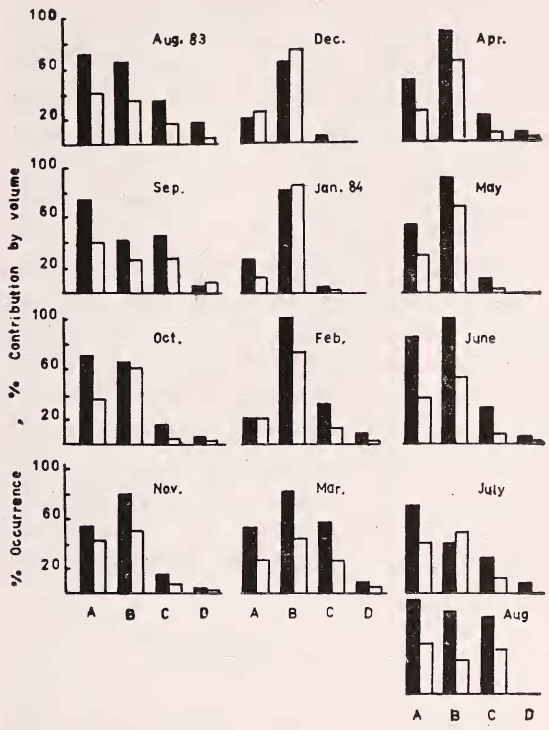

Fig. 4. Mean monthly changes in percentage occurrence and percentage contribution by volume of the main food items in the stomach of the bulbul. Solid bars; % occurrence, clear bars; % contribution by volume. A, animal food, B, fruits, C, flowers, D, leaves.

Discussion

Whitecheeked bulbul is mainly frugivorous, but supplements its diet with insects. Similar type of food has been described for *P. leucogenys* from India and Pakistan (Ali & Ripley 1971, Walters 1980). Other species of bulbuls have also been reported to feed on ripe fruits and insects. Ward (1969) described the food of *Pycnonotus goiavier* as being mainly ripe fruits and large insects including grasshoppers, mantises, beetles, moths and caterpillars; while Carleton & Owre (1975) showed that *Pycnonotus jocosus* consumes seedlings, growing shoots, flower parts and nectar in addition to fruits and insects as their main food. It seems frugivory is a main characteristic of the members of Pycnonotidae (Baker 1922, Austin 1961, Ali & Ripley 1971, Walters 1980).

P. l. mesopotamia consumed ripe fruits throughout the year, with very little seasonal variations. Dates were the main fruit and persisted in the diet for long periods starting from August (new crop) extending to March. This was mainly due to the system of management in date palm-citrus orchards, where management is concentrated on citrus crops while date-palms were only utilized as cover, and their fruits were usually left on the trees un-

touched. In similar orchards, where dates were properly cropped at season, a large quantity of dates scattered on the ground were left uncleaned, which in turn provide enough food for bulbuls over the winter. At the time when dates become short in supply, or their quality deteriorate, bulbuls shift their preference to other ripe fruits now available in their habitat, such as pomegranate, figs and peaches. This would last for a few months from the end of April to August, until the new crop of dates becomes available. In addition, more flowers, nectar and leaf buds become evident in the food and in particular, at times when the above two food items were not readily available (March and August). Insect food showed a well pronounced pattern of seasonal variation depending on their availability, and this variation was irrespective of that of plant food.

Despite the fact that bulbuls feed mainly on fruits, claims of damage were not entirely justified. Damage could occur during years of low production or when fruits are left on the trees for longer period than necessary after they are ripe. It is true that some fruits are more readily attacked than others. However, proper cropping at the time of ripening reduces damage to the minimum. This has been observed in some good quality dates, where a slight delay in harvesting the fruits led to immense damage. The abundance of this variety, however, is small compared to the common type used for cover.

Damage to orange and other citrus was negligible, and occurred only secondarily after other animals made the initial attempt on the fruits. The black rat *Rattus rattus* has been shown to cause such damage in date palm-citrus orchards (Khadim *et al.* 1984). The pomegranate suffer similar damage, and these, together with other fruits like peaches, attract bulbuls when heavily infested with insects (mostly Nitidulid beetles). A closely similar situation was reported by Carleton & Owre (1975) for the red whiskered bulbul in Florida.

Date palm-citrus orchards seem to be a highly suitable habitat that attracts a good number of bulbuls. The continuous availability of dates as food has probably diverted bulbuls from consuming other fruits and consequently reducing damage to those more wanted fruits by farmers. This could be ascertained by studying any of the single-fruit type orchards and comparing the findings with those of the present investigation.

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